



# The practical use of risk assessments of birdstrikes in Denmark

IBSC, 9 June 2009

- **The ICAO Council has adopted Amendment 7 to Annex 14**
- **requiring airport operators to establish a SMS as part of the certification process in 2005.**
- **Amendment 7 became effective on 24 March 2005.**

# The standard risk assessment matrix

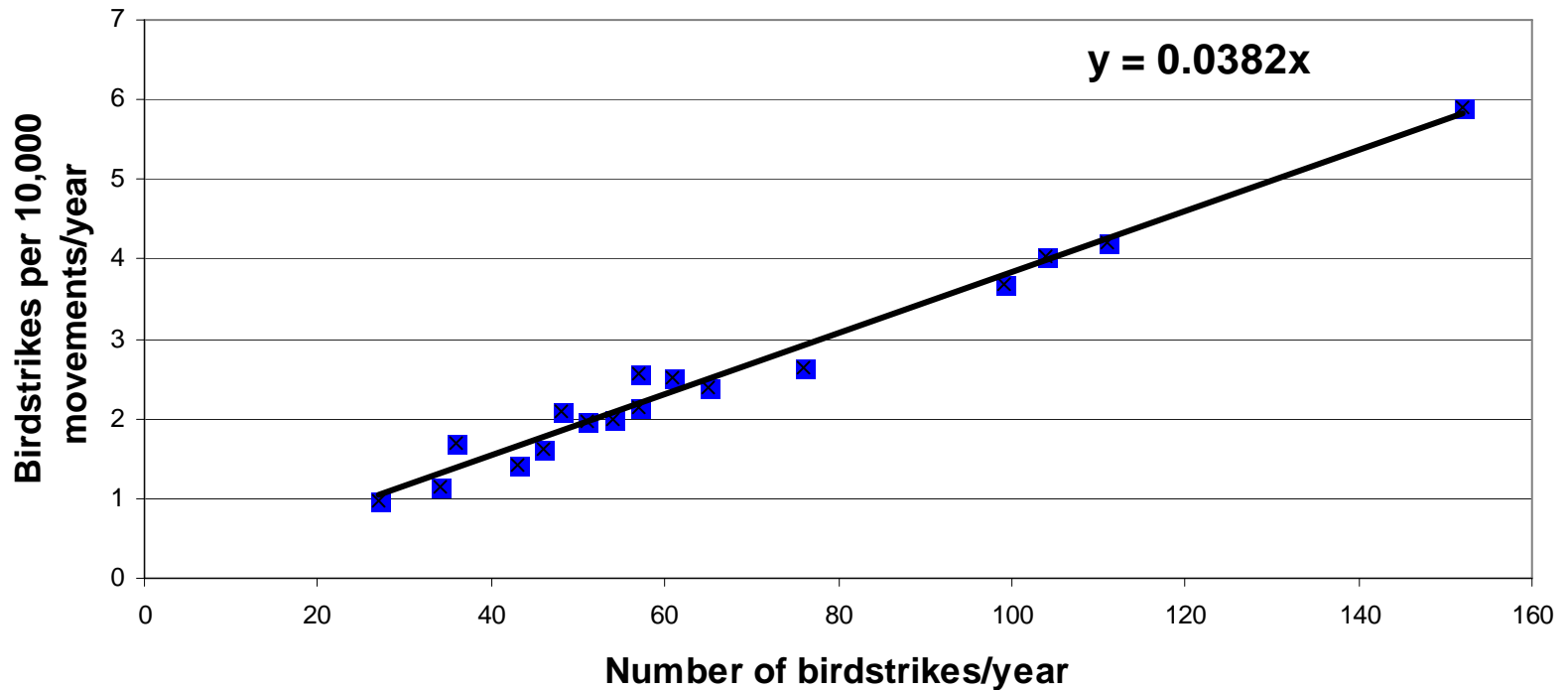
## Risk levels

<u>Severity</u>	Probability				
	Very high	High	Moderate	Low	Very low
Very high	Unacceptable*	Unacceptable	Unacceptable	Unacceptable	Marginal
High	Unacceptable	Unacceptable	Unacceptable	Marginal	Marginal
Moderate	Unacceptable	Unacceptable	Marginal	Acceptable	Acceptable
Low	Unacceptable	Marginal	Acceptable	Acceptable	Acceptable
Very low	Marginal	Acceptable	Acceptable	Acceptable	Acceptable

\*) Designation of risk levels after CAA-UK, CAP 772.

# The relationship between the frequency and the rate at CPH.

Birds identified in 1992-2008



# Two different approaches to define probability in a risk assessment matrix.

## Category Boundaries

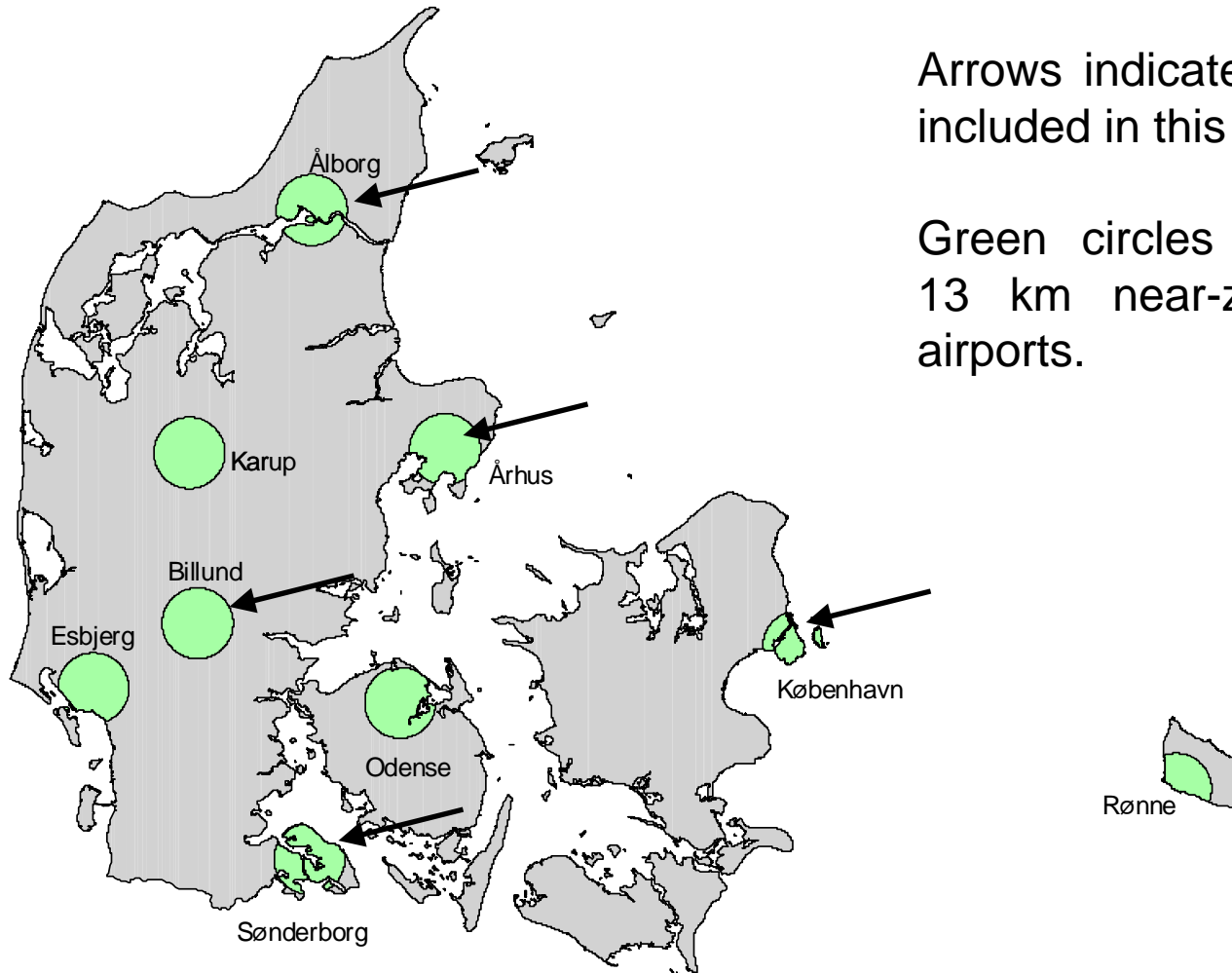
### No. of strikes per year (5 year)

<b>Frequency</b>	0 - 0.2	0.3 - 0.9	1 - 2.9	3 - 10	>10
<b>Category</b>	Very low	Low	Moderate	High	Very high

### Birdstrikes per 10.000 operationer

<b>Rate</b>	0 - 0.0114	0.0115 - 0.0382	0.0383 - 0.1148	0.1149 - 0.3830	>0.3830
<b>Kategori for rate</b>	Very low	Low	Moderate	High	Very high

# Certified airports in Denmark



Arrows indicate the airports included in this study.

Green circles indicate the 13 km near-zone of the airports.

# Risk assessment matrix, Copenhagen Airport.

EKCH 2004-2008

Average flight movements/year (2004-2008): 264,241.0

Frequency / probability

Frequency

Severity

		>10 Very high	3-10 High	1-2.9 Moderate	0.3-0.9 Low	0-0.2 Very low
Severity	>20% Very high				Cormorant Whooper-Swan	Mute Swan Great B-b. Gull Heron
	10-20% High		Herring Gull Buzzard	R-I. Buzzard	Mallard Pheasant	Shelduck Black-ba. Gull
	6-9.9% Moderate		Wood pigeon	Crow Marsh Harrier		
	2-5.9% Low	Kestrel	Common Gull Black-h. Gull Longeared Owl	Feral pigeon Shorteared Owl	Magpie Sparrowhawk Hobby	Partridge Woodcock Golden Plover
	0-1.9% Very low		Starling Swift Swallows	Skylark Meadow Pipit	Wheatear Chaffinch Thrashers Linnet	7 species





# EKSB 2004 - 2008

Average flight movements/year (2004-2008): 12,785.8

			Frequency / probability				
Frequency			>10	3-10	1-2.9	0.3-0.9	0-0.2
Rate			>0.38	0.11 - 0.38	0.04 - 0.11	0.01 - 0.04	0 - 0.01
			Very high	High	Moderate	Low	Very low
Severity	>20%	Very high					
	10-20%	High	Herring Gull	Pheasant	Herring Gull	Pheasant	
	6-9.9%	Moderate		Oystercatcher			Oystercatcher
	2-5.9%	Low	Lapwing Bl-head. Gull		Lapwing	B.-head. Gull	
	0-1.9%	Very low		Starling Skylark Swallows		Starling Skylark Swallows	

# EKYT 2004 - 2008

Average flight movements/year (2004-2008): 20,609.4

			Frequency / probability				
Frequency Rate			>10	3-10	1-2.9	0.3-0.9	0-0.2
			>0.38	0.11 - 0.38	0.04 - 0.11	0.01 - 0.04	0 - 0.01
			Very high	High	Moderate	Low	Very low
<b>Severity</b>	>20%	Very high					
	10-20%	High	Herring Gull Buzzard		Herring Gull Buzzard Pheasant		Pheasant
	6-9.9%	Moderate					
	2-5.9%	Low	Kestrel Lapwing	Blackh. Gull Com. Gull	Kestrel Lapwing Gold. Plover	B.-head. Gull Common Gull	Golden Plover
	0-1.9%	Very low	Skylark Swallows		Swallows Thrashers Great Tit Sparrow	Skylark	Thrashers Great Tit Sparrow

# EKAH 2004 - 2008

Average flight movements/year (2004-2008): 22,298.4

		Frequency / probability					
Frequency		>10	3-10	1-2.9	0.3-0.9	0-0.2	
Rate		>0.38	0.11 - 0.38	0.04 - 0.11	0.01 - 0.04	0 - 0.01	
		Very high	Heigh	Moderate	Low	Very low	
<b>Severity</b>	>20%	Very high					
	10-20%	Heigh	Buzzard		Buzzard		
	6-9.9%	Moderate		Crow		Crow	
	2-5.9%	Low	Kestrel	Common Gull	Kestrel	Common Gull	Woodcock
	0-1.9%	Very low	Skylark swallows	Starling	Skylark sparrow	Starling swallows	sparrow

# EKBI 2004 - 2008

Average flight movements/year (2004-2008): : 53,994.4

			Frequency / probability				
Frequency			>10	3-10	1-2.9	0.3-0,9	0-0.2
Rate			>0.38	0.1 - 0.38	0.04 - 0.11	0.01 - 0.04	0 - 0.01
			Very high	Heigh	Moderate	Low	Very low
Severity	>20%	Very high					
	10-20%	Heigh		Herring Gull	Herring Gull		
	6-9.9%	Moderate				Crow	Wood pigeon Crow
	2-5.9%	Low	Kestrel	Kestrel	B.-head. Gull Lapwing	Partridge Lapwing B.-head. Gull	Partridge Magpie
	0-1.9%	Very low		Skylark Swallows Sparrow	Starling	Starling Skylark Swallows Sparrow	

# ENZV (Norway) 2004 - 2008

Average flight movements/year (2004-2008): 75,168.8

			Frequency / probability				
Frequency			>10	3-10	1-2.9	0.3-0.9	0-0.2
Rate			>0.38	0.11 - 0.38	0.04 - 0.11	0.01 - 0.04	0 - 0.01
			Very high	High	Moderate	Low	Very low
<b>Severity</b>	>20%	Very high				Swan	Swan
	10-20%	High			Curlew B.-back. Gull	Curlew B.-back. Gull	
	6-9.9%	Moderate		Oystercatcher Wood pigeon	Crow Oystercatcher Woodpigeon	Crow	
	2-5.9%	Low	Common Gull	Common Gull	B.-head.Gull Lapwing Golden Plover Woodcock	B.-head.Gull Lapwing Golden Plover 3 species	Grey Plover Merlin Little Auk
	0-1.9%	Very low	Swallow	Swallow Skylark Dunlin Ringed Plover	Skylark Dunlin Ringed Plover 4 species	Blackbird Linnet Sand-Martin Swift 5 species	Snow Bunting 4 waders

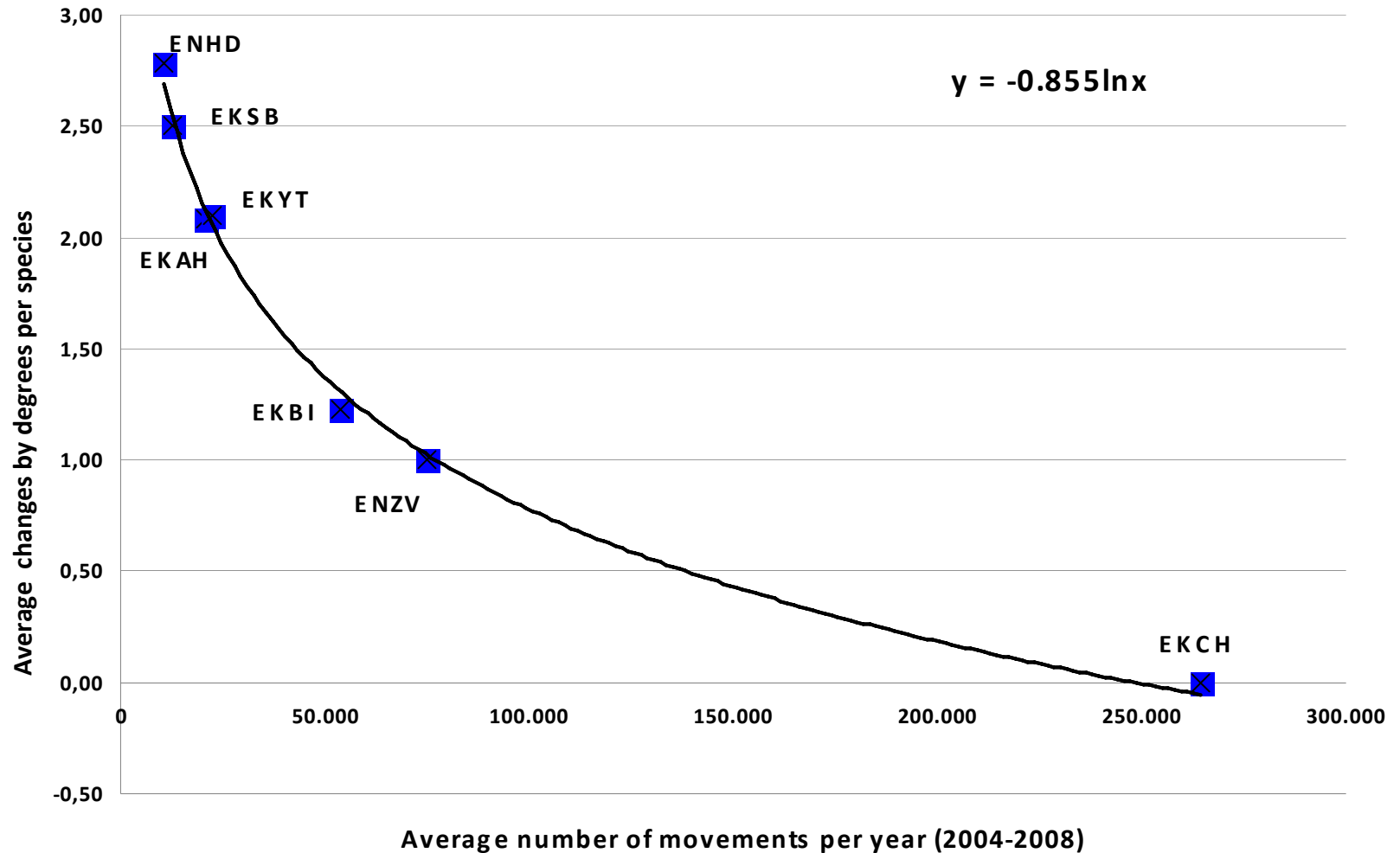
**ENHD (Norway) 2004 - 2008** Average flight movements/year (2004-2008): 10.703 4

		Frequency / probability					
Frequency		>10	3-10	1-2.9	0.3-0.9	0-0.2	
Rate		>0.38	0.11 - 0.38	0.04 - 0.11	0.01 - 0.04	0 - 0.01	
		Very high	High	Moderate	Low	Very low	
<b>Severity</b>	>20%	Very high					
	10-20%	High		Herring Gull		Herring Gull B.-back. Gull	
	6-9.9%	Moderate					
	2-5.9%	Low	Lapwing Golden Plover	Woodcock Grey Plover Knot Little Auk	Golden Plover	Lapwing	Woodcock Grey Plover Knot Little Auk
	0-1.9%	Very low	Skylark Dunlin Linnet Ringed Plover	Ringed Plover 6 species	Dunlin	Skylark Linnet Redpoll	5 species

## Changes in risk values of some species in common at four Danish airports using the different approach to measure probability.

Airport	EHCH		EKBI		EKAH		EKYT	
Av.movem./yr.	264,241.0		53,994.4		22,298.4		20,609.4	
	No. per yr.	Rate	No. per yr.	Rate	No. per yr.	Rate	No. per yr.	Rate
Herring gull								
Pheasant								
Blackh. Gull								
Com. Gull								
Kestrel								
Buzzard								
Lapwing								
Skylark								
Crow								
Starling								
Swallows								
<i>Changes by degrees</i>		<b>0</b>		<b>10</b>		<b>17</b>		<b>19</b>

## Changes by degrees in *Probability* when converting the frequency of birdstrikes into rate.





# The Task?

1. To advise airports serving lesser than 100,000 flight movements/yr to prefer the birdstrike *rate* as the probability parameter.
2. To improve the category boundaries using for the birdstrike *rate* by including data from other airports.
3. To improve the calculation of severity measures by adding data from other national birdstrike data bases.
4. To set up an international standard for birdstrike risk assessment linked to the IBSC's website.
5. To appoint a group working with the items above.

